



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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SERIAL NO.: 10/624,033 EXAMINER: Price, Craig James
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TITLE: "PIPE FLOW STABILIZER"

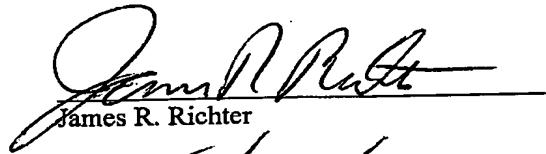
DECLARATION OF JAMES R. RICHTER

1. I am the named inventor of the above referenced patent application.
2. Attached as Exhibit 1 is a section of the Systems and Equipment Handbook published by The American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE®) which describes the industry accepted arrangement in liquid pipelines which include a pump and a valve, showing that the valve must be spaced away from the pump by a pipe length of at least 5 to 10 times the diameter of the pipe. The reason for this is that pumps create turbulence and that turbulence can damage, destroy or render ineffective the pipeline or valve if the turbulence is not allowed to dissipate, such as by flowing through a sufficiently long pipe between the pump and the valve. This distance requirement has been in place for many years.
3. Attached as Exhibit 2 is a page from the instruction manual for a Bell & Gossett (an industry leader) valve, specifying that a length of unrestricted straight pipe equivalent to 5 pipe diameters must be provided upstream of the valve. This statement, and other similar statements and requirements by other valve manufacturers demonstrate the industry acceptance of the requirement to provide at least 5 pipe diameters of straight pipe upstream of a valve in order to reduce turbulence in the liquid before it reaches the valve.
4. Attached as Exhibit 3 is the cover and an article from the ASHRAE® Journal of April 2005. The article describes innovative products that were displayed at the 2005 AHR Expo industry trade show, which is the main trade show for this industry. In the article, Bill Dillard, a member of ASHRAE who has been attending this trade show for over 25 years, making him a veteran in the industry. In this article, the first innovative product he mentions, is the product incorporating the invention claimed in the present application.

5. Attached as Exhibit 4 is a reprint from a trade magazine entitled the News, which describes the product incorporating the invention claimed in the present application as being a Gold Winner in the Dealer Design Awards for 2005, with words of praise from two separate judges of the competition.

6. Attached as Exhibit 5 is a Case Study describing the product incorporating the invention claimed in the present application which was chosen by the Indiana University Cyclotron Facility (IUCF) to be used in the cooling system for the cyclotron. A limited, or insufficient space for piping was causing premature failure of a pump in the system, and the use of the product incorporating the invention solved the problem, and was also selected by IUCF to replace their diffuser on the main pump.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



James R. Richter

5/15/06

Date

Many manufacturers of balancing valves produce circular slide rules to calculate circuit flow based on pressure difference readout across the balancing valve, its stem position, and/or the valve's flow coefficient. This calculator can also be used for selecting the size and setting of the valve when the terminal design flow conditions are known.

Automatic Flow-Limiting Valves

A differential pressure-actuated flow control valve, also called an automatic flow-limiting valve (Figure 21), regulates the flow of fluid to a preset value when the differential pressure across it is varied. This regulation (1) helps prevent an overflow condition in the circuit where it is installed and (2) aids the overall system balance when other components are changing (modulating valves, pump staging, etc.).

Typically, the valve body contains a moving element containing an orifice, which adjusts itself based on pressure forces so that the flow passage area varies.

The area of an orifice can be changed by either (1) a piston or cup moving across a shear plate or (2) increased pressure drop to squeeze the rubber orifice in rubber grommet valves.

A typical performance curve for the valve is shown in Figure 22. The flow rate for the valve is set. The flow curve is divided into three ranges of differential pressure: the start-up range, the control range, and the above-control range.

Balancing Valve Selection

The balancing valve is a flow control device that is selected for a lower pressure drop than an automatic control valve (5 to 10% of the available system pressure). Selection of any control valve is based on the pressure drop at maximum (design) flow to ensure that the valve provides control at all flow rates. A properly selected balancing valve can proportionally balance flow to its terminal with flow to the adjacent terminal in the same distribution zone. Refer to

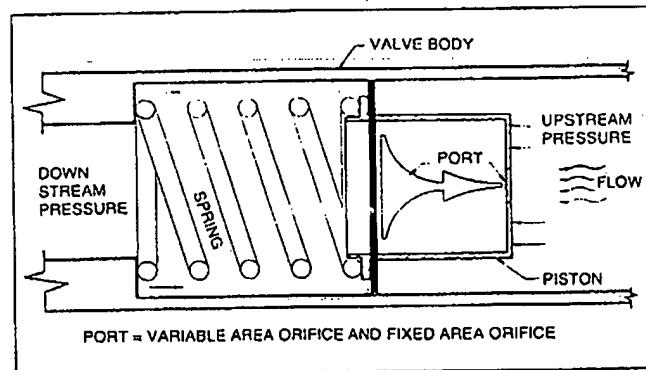


Fig. 21 Automatic Flow-Limiting Valve

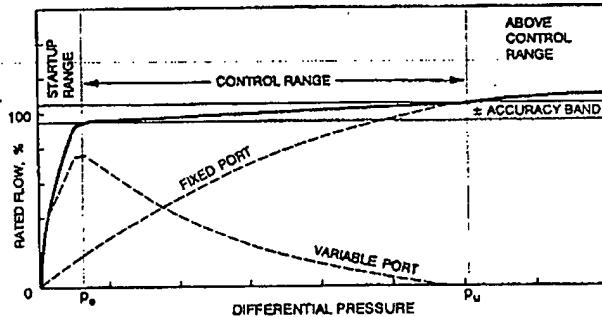


Fig. 22 Automatic Flow-Limiting Valve Curve

Chapter 36 of the 1999 ASHRAE Handbook—Applications for balancing details.

MULTIPLE-PURPOSE VALVES

Multiple-purpose valves are made in straight pattern or angle pattern. The valves can provide shutoff for servicing or can be partially closed for balancing. Pressure gage connections to read the pressure drop across the valve can be used with the manufacturer's calibration chart or meter to estimate the flow. Means are provided to return the valve to its as-balanced position after shutoff for servicing. The valve also acts as a check valve to prevent backflow when parallel pumps are used and one of the pumps is cycled off.

Figure 23 shows a straight pattern multiple-purpose valve designed to be installed 5 to 10 pipe diameters from the pump discharge of a hydronic system.

Figure 24 shows an angle pattern multiple-purpose valve installed 5 to 10 pipe diameters downstream of the pump discharge with a common gage and a push button trumpet valve manifold to measure the differential pressure across the strainer, pump, or multiple-purpose valve. From this, the flow can be estimated. The differential pressure across the pump suction strainer can also be estimated to determine whether the strainer needs servicing.

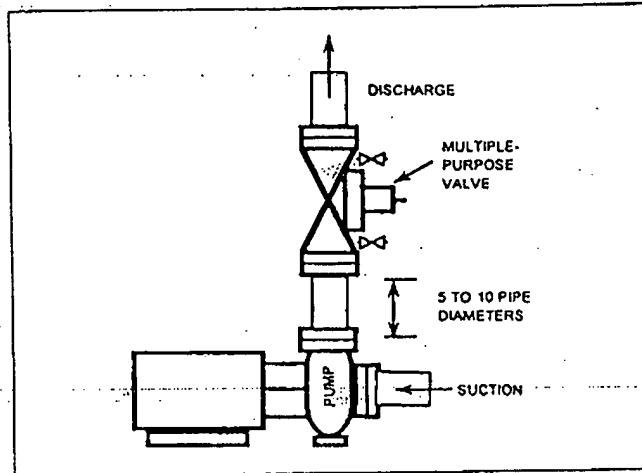


Fig. 23 Typical Multiple-Purpose Valve (Straight Pattern) on Discharge of Pump

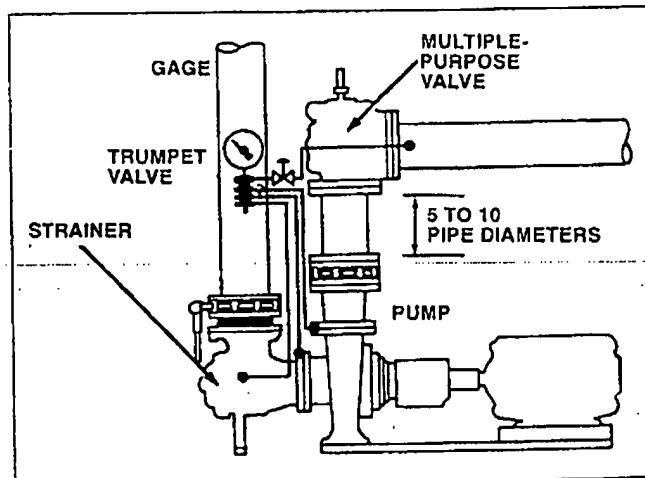
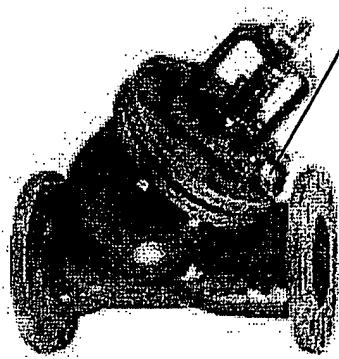


Fig. 24 Typical Multiple-Purpose Valve (Angle Pattern) on Discharge of Pump



Warning Label Part Number
V56846 Installed in this location.
If missing, it must be replaced.

Circuit Setter® Balance Valves – 4" thru 12" sizes

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.



SAFETY INSTRUCTION

This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD!**

DESCRIPTION

Bell & Gossett Circuit Setter Balance Valves are precision engineered valves which function as precise system balancing valves and highly accurate flow meters. They will also function as a positive shutoff service valve. They are equipped with an easy to operate memory stop feature which allows the circuit setter to be closed for system service and yet to be returned to the previously determined setting.

OPERATIONAL LIMITS

Maximum Operating Pressure: 175 psig (1207 kPa)
Maximum Operating Temperature: 250°F (121°C)

INSTALLATION INSTRUCTIONS:

1. To retain calibrated accuracy, a minimum length of unrestricted straight pipe equivalent to 5-pipe diameters upstream and 2-pipe diameters downstream must be maintained immediately adjacent to the Circuit Setter Balance Valves.
2. Circuit Setter Balance Valves are uni-directional and must be installed with the arrow cast on body of valve pointing in direction of flow. Bell & Gossett Circuit Setter Balance Valves may be installed either in vertical or horizontal pipe with valve stem pointing up or down.

IMPORTANT: Bell & Gossett Circuit Setter Balance Valves are not recommended for use with meter connections pointing down. Dirt will collect in the connections and foul up the readout valves and readout meters.

3. Circuit Setter Balance Valves are furnished with 125# ANSI cast iron flanges or grooved connectors rated at 175 psi (1207 kPa) at 250°F (121°C). Companion ANSI flanges or grooved connectors should be selected with suitable gaskets and bolting to withstand rated pressure and temperature. Bolts are to be properly torqued and tightened in a criss cross pattern.

WARNING: The use of improper mating flanges, connectors, gaskets or bolting can cause flange or connector failure resulting in the loss of hot or cold system fluid. Use only companion cast iron ANSI flanges or connectors with appropriate gaskets and properly tightened bolts. Failure to follow this instruction can result in serious personal injury and/or property damage.

4. Check connections for leaks and retorque if necessary.

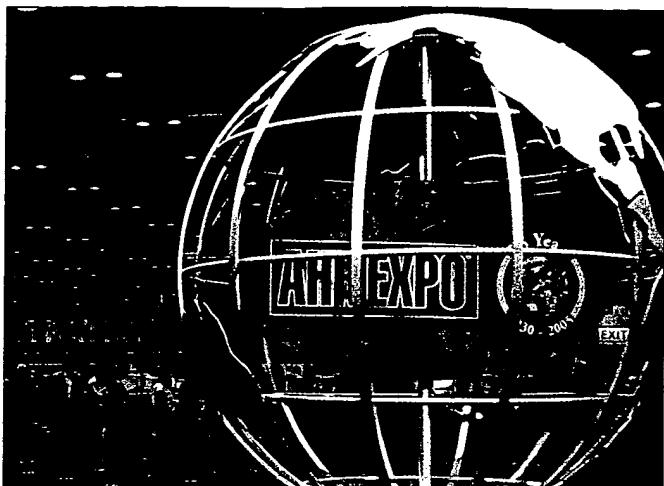
ASHRAE® JOURNAL

The magazine of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Setting Fees for Building Green

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Inside: HVAC Issues for Data Centers
Also: Underventilation in Office Buildings • Filtration & Security



This year's show marks the 75th year of the Show. It also continues a partnership with ASHRAE and the International Exposition Company that started with the first Show, Jan. 27-31, 1930, at the Commercial Museum in Philadelphia. At that time, air conditioning was just emerging as a technology, and the Show was known as the International Heating and Ventilating Exposition. ASHRAE was the American Society of Heating and Ventilating Engineers.

Showcasing Innovation

AHR Expo Attendees See, Learn and Network

ORLANDO, Fla.—For 75 years, the AHR Expo has been the place to see what's hot in HVAC&R products and get a feel for where the industry is going. This year's Expo Feb. 5-7 provided another example. A record 1,871 companies exhibited what is likely the broadest display of products in the Show's history.

So what was hot in at the 2005 AHR Expo? That depends on whom you ask. What follows are the views from several people walking the Show floor.

Bill Dillard, Member ASHRAE, has been attending shows since 1979. He said Metraflex's CRV® Flex™ caught his attention. The CRV Flex consists of a specially designed set of stationary vanes placed in the suction-side pump connector, upstream of an elbow. The vanes serve to rotate fluid as it enters the elbow for eliminating turbulence.

Dillard also mentioned the Danfoss Turbocor Compressors'

TT300 compressor, which features magnetic bearings for an oil-free lubrication system to achieve high compressor efficiencies for water-, air- and evaporatively cooled applications.

Rajinder K. Suri, Ph.D., Member ASHRAE, said he was impressed with several products that won 2005 AHR Expo Innovation Awards. He said Danfoss' booth, featuring the ICV Control Valve, was interesting.

The product, which won the 2005 AHR Expo Innovation Award in the refrigeration category, is designed to be smaller, lighter, less likely to leak, and easier and faster to maintain.

Suri also mentioned Hardcast, Carlisle Coatings & Waterproofing's booth, which includes the FLEX-GRIP 550, a spray-applied duct sealant, which won the 2005 AHR Expo Innovation Award in the ventilation category. FLEX-GRIP is used to seal transverse and longitudinal duct joints, duct runouts and fittings.

Suri also noted Petra, featuring its ultra-low-noise chiller series, and Carrier, displaying the AquaSnap Air-Cooled chiller.

Dan Harkins, president of Thermal Design, Stoughton, Wis., said he was looking for more whole building system designs.



(Left) The International Exposition Company celebrated the Show's 75th edition with photo displays. (Center) Ken Kresyman and Joe Caralone look into Spence Engineering's pressure-powered pump, which returns condensate to the boiler. (Right) Joseph Dore gets more information about Ductmate Industries' clutch wire rope hanging system for ducts.